We claim:

1. A method for remotely sensing subsurface objects and structures, comprising:

a. selecting a host and a subsurface object site environment, wherein said host and subsurface object site environment are naturally heated;

b. surveying said host and said object site by:

simulating the temperatures of said host and said object site;

calculating the thermal inertias of said host and said object site; and

computing the twice-daily and bi-yearly temperature spreads of said host and said object site;

c. determining whether the thermal inertia of said object site is distinguishable from that of said host;

d. changing the environment of said host and said object site if the temperature spread of said object site is not distinguishable from that of said host;

e. repeating steps a-d until said object site is distinguishable from that of said host;

f. scanning said host and said object site at different times with two different IR wavelengths and recording a spatial sequence of dual-band IR images;

g. calculating (using image processing code) signal ratios and differences to form temperature, emissivity-ratio and corrected-temperature maps;

h. co-registering , corrected-temperature and twice yearly or twice daily temperature-spread maps with said corrected-temperature maps;

i. correcting said temperature maps and said temperature-spread maps;

j. removing foreign object thermal clutter from said temperature-spread maps;

k. determining object location, size and shape from said temperature maps;

l. determining object, thickness, volume, and depth information from said temperature-spread maps; and

m. providing a 3D display of said object.

2. The method of claim 1, wherein said host and said subsurface object site environment are located from data selected from the group consisting of aerial photos, satellite imagery and site maps that include information selected

from the group consisting of surface conditions, soil type, vegetation, geology, meteorology and topography.

3. The method of claim 1, wherein said host is selected from the group consisting of rock, pavement, concrete, gravel, sand, soil, mud, water.

4. The method of claim 1, wherein said object thermal clutter is selected from the group consisting of a shadow, a track, a stain, disturbed terrain, a hole, vegetation, a foreign object, foreign material, foreign soil, water, cool air pools and roughness variations.

5. The method of claim 1, wherein the step of simulating the temperatures of said host and said object site is carried out with an iterative surface-climate energy budget (SCEB) code.

6. The method of claim 5, wherein said SCEB code inputs a plurality of environmental variables to calculate the surface temperature of said object site.

7. The method of claim 1, wherein surface clutter is eliminated by separating temperature data from spatially-varying surface-emissivity data, to

obtain true, time-varying temperature-difference values at scanned points of said object area, from a plurality of points in space and time.

8. The method of claim 1, wherein subsurface clutter is eliminated by separating thermal inertia data for normal, undisturbed host and targeted-object materials, from anomalous thermal inertia data for disturbed host or foreign-object materials, characterized by their depths, volumes and physical features, unlike the targeted object and host material, to obtain true, spatially-varying thermal-inertia differences which characterize the subsurface targeted-object site, from a plurality of points in space and time.

9. The method of claim 8, wherein separating surface temperature data from spatially-varying surface emissivity data is achieved by using the following temperature ratio equation to obtain a temperature map:

$[SWB/LWB=(\varepsilon_5)(\varepsilon_{10})*(T/T_0)^5]$

$(T/T_{AV})^5 = (S/S_{AV})/(L/L_{AV})$, where S is the short wavelength intensity, S_{AV} is the average value of the pixels in S, L is the long wavelength intensity and L_{AV} is the average value of the pixels in L.

10. The method of claim 9, wherein separating surface temperature data from spatially-varying surface emissivity data is further achieved by using the following emissivity-ratio equation to obtain an emissivity ratio map:

$$[(LWB)^2/(SWB)=(\varepsilon_{10})^2/(\varepsilon_5)=\varepsilon]$$
$$\text{E-ratio}=(L/L_{AV})^2/(S/S_{AV}).$$

11. The method of claim 10, wherein determining whether an object exists in said host material, comprises comparing said temperature map, with said emissivity-ratio map, to observe heat flow anomalies generated by the subsurface object, host material or foreign-object, and remove unrelated emissivity, or reflected signals, forming clutter.

12. The method of claim 10, wherein diurnal or seasonal temperature spread, for said corrected temperature maps, is used to distinguish bulk thermal properties (such as thermal inertia) of said object within the host material, from bulk thermal properties (such as thermal inertia) of an equal volume of said host material.

13. The method of claim 1, wherein said scanning comprises taking images at specified times, based on the Surface Climate Energy Budget temperature simulations.

14. The method of claim 13, wherein said images in said sequence are typically taken at midday (near noon), and after midnight (before dawn), to detect shallow objects.

15. The method of claim 13, wherein said images in said sequence are typically taken during the autumn (September or October), and during the spring (March or April), to detect deep objects.

16. The method of claim 1, wherein said scanning is performed with at least the same number of detectors as the number of scanned wavelengths.

17. The method of claim 1, wherein said scanning occurs for at least two different infrared wavelength bands comprising a long wavelength band ranging from 8-12 micrometers and a short wavelength band ranging from 3-5 micrometers.

18. The method of claim 1, wherein said subsurface objects are selected from the group consisting of hollow, or semi-empty objects and structures which typically have less thermal inertia (resistance to temperature change) than their surroundings of undisturbed earth.

19. The method of claim 1, wherein said subsurface objects are selected from the group consisting of solid, or semi-solid objects and structures which have more thermal inertia (resistance to temperature change) than their surrounding host material.

20. A thermal imaging method to detect subsurface objects or air gaps, comprising:

imaging two different infrared (IR) wavelength bands a first time from a first location and a second location to obtain a first temperature map;

imaging said two different IR wavelength bands a second time from said first location and said second location to obtain a second temperature map;

combining said first temperature map and said second temperature map to obtain a first temperature spread at said first location and a second temperature spread at said second location; and

comparing said first temperature spread with said second temperature spread to determine whether an object or structure is located beneath said first location or said second location.